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(73) Proprietor: **OSTEONICS CORP.**
59 Route 17
Allendale
New Jersey 07401 (US)

(72) Inventor: **Zarnowski, Alfred J.**
362 West End Avenue
North Plainfield
New Jersey 07063 (US)
Inventor: **Sidebotham, Christopher G.**
18 Keats Road
Scotchtown
New York 10940 (US)

(74) Representative: **Jones, Michael Raymond et al**
HASELTINE LAKE & CO.
Hazlitt House
28 Southampton Buildings
Chancery Lane
London WC2A 1AT (GB)

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Description

The present invention relates generally to the implant of prosthetic joints and pertains, more specifically, to the preparation of the distal femur for the implant of a femoral knee prosthesis, utilizing a cutting guide to assist in establishing the surfaces necessary for locating and securing the prosthesis in place on the femur.

The implant of a prosthetic knee joint requires that the distal femur be prepared to receive the femoral component of the knee prosthesis by cutting the bone of the femur to establish accurately located surfaces against which the femoral knee prosthesis will rest upon implant of the femoral component. Various guides are available to the surgeon for assisting in guiding a saw blade during use of the saw blade to make the cuts which establish the desired surfaces. These guides usually are located and secured upon a transverse surface established initially on the distal femur to provide guide surfaces for guiding the saw blade during the execution of an axially directed anterior femoral cut, an axially directed posterior femoral cut, an anterior chamfer and a posterior chamfer. Currently available guides require either separate guide components secured sequentially to the transverse surface to accomplish the various cuts, or a single guide component which can guide a saw blade through partial execution of the various cuts, with the cuts being completed subsequent to removal of the guide component. Since it is desirable that all of the necessary cuts be established as quickly as possible, concomitant with safety and accuracy, it would be advantageous to have available a cutting guide which enables all of the required cuts to be executed fully and completely with a single cutting guide, without the necessity for the sequential use of a plurality of cutting guides.

Previously known cutting guides are disclosed in WO 88/04912. These cutting guides have a main body including attachment means to attach the cutting guide to the femur during the cutting process. The cutting guides also comprise guide elements which include a pair of guide surfaces that engage opposite side of the saw blade to guide the saw blade during the cutting process.

These cutting guides go some way to enabling the required cuts to be made without extensive changes of guide components. However three separate guides are still provided to achieve all the required cuts and it is necessary to change over one to another during the cutting process.

The present invention provides a cutting guide which enables the execution of all of the necessary cuts, as outlined above, fully and completely, utilising only a single cutting guide, and has several objects and advantages, some of which are summarised as follows: Provides a single cutting guide for guiding a saw blade during the execution of the complete anterior femoral cut, posterior femoral cut, anterior chamfer and posterior chamfer during the implant of the femoral component of a prosthetic knee joint; Enhances the speed and accuracy with which all of the aforesaid cuts can be accomplished; Enables all of the aforesaid cuts to be established with an accurately fixed relationship relative to one another, as a result of the placement of all of the saw blade guiding surfaces on a single guide; Minimizes the time required for the completion of all of the aforesaid cuts, while maintaining safety, thereby reducing the overall operating time, to the benefit of the patient and the surgeon; Reduces the possibility of error in the accurate location of the cuts; Is simple and effective in use; Aids in the preservation of the tissue remaining upon completion of the cuts by minimizing any trauma related to the installation and removal of cutting guides; Provides a practical and economical construction which is rugged enough to withstand the rigors of use over a long service life, with the preservation of accuracy and ease of use.

The above objects and advantages, as well as further objects and advantages, are attained by the present invention which may be described briefly as a cutting guide for guiding a saw blade during the preparation of a femur for the implant of a femoral knee prosthesis, the cutting guide enabling guiding of the saw blade for cutting an axially directed anterior femoral cut, an axially directed posterior femoral cut, an anterior chamfer and a posterior chamfer, while the cutting guide remains located on and secured to the femur in a single position on a transverse surface located along the distal femur, the cutting guide comprising: a base member; locating and securing means on the base member for locating and securing the base member on the femur at the transverse surface; opposite side members extending from the base member in an axial direction distally relative to the transverse surface; a first set of guide members extending laterally between the side members and located to delineate transversely opposite boundaries of an axially directed anterior cutting path intercepting the anterior femur, the first set of guide members including opposite guide surfaces spaced apart axially along the anterior cutting path for guiding the saw blade along the anterior cutting path during the anterior femoral cut; a second set of guide members spaced transversely from the first set of guide members, the second set of guide members extending laterally between the side members and located to delineate transversely opposite boundaries of an axially directed posterior cutting path intercepting the posterior femur, the

second set of guide members including opposite guide surfaces spaced apart axially along the posterior cutting path for guiding the saw blade along the posterior cutting path during the posterior femoral cut; and a further set of guide members located transversely between the first and second sets of guide members, the further guide members extending laterally between the side members and located for delineating transversely opposite boundaries of an oblique anterior chamfer cutting path and delineating transversely opposite boundaries of an oblique posterior chamfer cutting path, the further guide members including first opposite guide surfaces spaced apart along the oblique anterior chamfer cutting path for guiding the saw blade along the oblique anterior chamfer cutting path during the anterior chamfer cut and second opposite guide surfaces spaced apart along the oblique posterior chamfer cutting path for guiding the saw blade during the posterior chamfer cut; the side members being spaced apart laterally a distance sufficient to provide each of the delineated anterior cutting path, posterior cutting path, anterior chamfer cutting path and posterior chamfer cutting path with a continuous, uninterrupted lateral extent corresponding to the full lateral extent of the respective anterior femoral cut, posterior femoral cut, anterior chamfer and posterior chamfer, whereby the full anterior femoral cut, the full posterior femoral cut, the full anterior chamfer and the full posterior chamfer are accomplished while the cutting guide is located and secured on the femur in the single position on the transverse surface of the distal femur.

The invention will be understood more fully, while still further objects and advantages will become apparent, in the following detailed description of a preferred embodiment of the invention illustrated in the accompanying drawing, in which:

FIG. 1 is a pictorial perspective view of the distal end of a femur, showing an initial step in preparation for the implant of a prosthetic knee joint;

FIG. 2 is a pictorial perspective view showing a cutting guide constructed in accordance with the present invention in use at the distal end of the femur;

FIG. 3 is an enlarged cross-sectional view taken along line 3-3 of FIG. 2;

FIG. 4 is a view similar to that of FIG. 2, but illustrating the execution of another cut;

FIG. 5 is an enlarged cross-sectional view taken along line 5-5 of FIG. 4;

FIG. 6 is a pictorial perspective view similar to FIG. 1, but showing a fully-prepared distal femur;

FIG. 7 is a perspective view of component parts of the cutting guide illustrating the construction of the cutting guide;

FIG. 8 is an enlarged fragmentary view of a portion of FIG. 3; and

FIG. 9 is an enlarged fragmentary view of a portion of FIG. 5.

Referring now to the drawing, and especially to FIG. 1 thereof, a femur is illustrated at 10 and is seen to have a distal end 12 which has undergone initial preparation for the implant of a femoral component of a knee prosthesis (not shown) to the extent that a distal portion (shown in phantom at 14) has been removed and a transverse surface 16 has been established at the distal end 12. Transverse surface 16 is planar, and a pair of axially extending holes 18 have been drilled into the bone of the femur 10 for purposes which will be explained below.

Turning now to FIGS. 2 and 3, a cutting guide constructed in accordance with the invention is illustrated at 20 and is secured to the distal end 12 of femur 10. Cutting guide 20 includes a base member 22 having a planar basal surface 24 which is seated upon the transverse surface 16. A pair of laterally spaced apart locating and securing posts 26 are integral with the base member 22 and project in a direction normal to the basal surface 24 to enter the holes 18, which holes 18 are generally complementary to the posts 26 so that the posts 26 cooperate with the holes 18 to locate and secure the cutting guide 20 at a predetermined position on the distal femur. A pair of opposite side members 30 are integral with the base member 22 and extend from the base member 22 in an axial direction distally relative to the transverse surface 16. A pair of handgrips 32 extend laterally outwardly in opposite directions from the side members 30 and facilitate manipulation of the cutting guide 20 during installation and removal of the cutting guide 20, as well as during use of the cutting guide 20.

A first set of guide members is shown as a pair of guide members in the form of a first cylindrical bar 34 and a second cylindrical bar 36, both bars 34 and 36 extending laterally, parallel to one another, from one to the other of the side members 30. The bars 34 and 36 are located to delineate transversely opposite boundaries 38 of an axially directed anterior cutting path 40 intercepting the anterior femur 42, the bars 34 and 36 including opposite guide surfaces 44 and 46 adjacent the corresponding opposite boundaries 38 and spaced apart axially along the anterior cutting path 40. Thus, a saw blade 50 inserted between the guide surfaces 44 and 46 and urged simultaneously against both guide surfaces 44 and 46 follows the anterior cutting path 40 and executes the anterior femoral cut 52 with certitude and accuracy. A second set of guide members is shown as a pair of guide members in the form of a third cylindrical bar

54 and a fourth cylindrical bar 56, both bars 54 and 56 extending laterally, parallel to one another, from one to the other of the side members 30. The bars 54 and 56 are located to delineate transversely opposite boundaries 58 of an axially directed posterior cutting path 60 intercepting the posterior femur 62, the bars 54 and 56 including opposite guide surfaces 64 and 66 adjacent the corresponding opposite boundaries 58 and spaced apart axially along the posterior cutting path 60. Insertion of the saw blade 50 between the guide surfaces 64 and 66 and the simultaneous urging of the saw blade 50 against both guide surfaces 64 and 66 assures that the saw blade follows the posterior cutting path 60 and executes the posterior femoral cut 72 with certitude and accuracy.

A further set of guide members is provided by a pair of guide members in the form of base member 22 and a cross-bar 74, both of which are located transversely between the first and second sets of guide members and extend laterally between the side members 30, from one side member 30 to the other side member 30. As seen in FIGS. 4 and 5, base member 22 and cross-bar 74 are located so as to delineate the opposite boundaries 76 of an oblique anterior chamfer cutting path 78, and the opposite boundaries 80 of an oblique posterior chamfer cutting path 82. Opposite guide surfaces 84 and 86 are located on the base member 22 and the cross-bar 74, respectively, and are spaced apart along the oblique anterior chamfer cutting path 78 for guiding the saw blade 50 along the oblique anterior chamfer cutting path 78, when the saw blade 50 is inserted between the base member 22 and the cross-bar 74 and urged against the guide surfaces 84 and 86 as shown, so that the anterior chamfer 88 is executed with certitude and accuracy. Likewise, opposite guide surfaces 90 and 92 are located on the base member 22 and the cross-bar 74, respectively, and are spaced apart along the oblique posterior chamfer cutting path 82 for guiding the saw blade 50 along the oblique posterior chamfer cutting path 82, when the saw blade 50 is inserted between the base member 22 and the cross-bar 74 and urged against the guide surfaces 90 and 92 as shown in phantom in FIG. 5, so that the posterior chamfer 94 is executed with certitude and accuracy. Guide surfaces 84 and 90 are essentially flat and extend generally parallel to the respective anterior and posterior chamfer cutting paths 78 and 82.

It is noted that the side members 30 are spaced apart laterally a distance sufficient to provide each of the delineated anterior cutting path 40, posterior cutting path 60, anterior chamfer cutting path 78 and posterior chamfer cutting path 82 with a continuous, uninterrupted lateral extent corresponding to the full lateral extent of the respective anterior femoral cut 52, posterior femoral cut 72, anterior chamfer 88 and posterior chamfer 94, whereby the full anterior femoral cut 52, the full posterior femoral cut 72, the full anterior chamfer 88 and the full posterior chamfer 94 are accomplished while the cutting guide 20 is secured to the femur 10 in the single illustrated position on the transverse surface 16 of the distal femur. Subsequent to the completion of all of the four cuts set forth above, the cutting guide 20 is removed from the femur 10, and the preparation of the distal femur is complete, as illustrated in FIG. 6.

Turning now to FIG. 7, cutting guide 20 preferably is constructed by assembling discrete individual component parts, as by welding the individual component parts into an integrated assembly. Thus, each of the cylindrical bars 34, 36, 54 and 56 are joined to the side members 30, as by welding at the respective ends of the cylindrical bars. Likewise, the base 22 and the cross-bar 74 are joined to the side members 30, as by welding at the respective ends thereof. In order to attain accuracy in the relative location of the component parts in the completed assembly, cylindrical bars 34, 36, 54 and 56 include projections 100 at the ends thereof, and the side members 30 include complementary recesses 102 into which the projections 100 are fitted prior to welding. For the same purpose, the ends of base 22 and cross-bar 74 are fitted into respective notches 104 and 106 in the side members 30, the notches 104 and 106 being complementary to the respective ends of the base 22 and the cross-bar 74. Posts 26 include integral pads 108 which are fitted into complementary recesses (not shown) in base 22 for accurate location of the posts 26 prior to welding the posts in place. Handgrips 32 are received within respective collars 110 affixed to the side members 30, as by welding, and are selectively attached to and detached from the collars 110 by complementary threaded elements 112 and 114. Preferably, all of the component parts are placed in a fixture (not shown) prior to joining the parts, to further assure accuracy in the location of the guide surfaces provided by the laterally extending component parts, relative to the basal surface 24, with concomitant accuracy in the location of the guide surfaces relative to the transverse surface 16 of the distal femur. Thus, the integrated assembly provides the necessary accuracy in an economically constructed cutting guide.

Referring now to FIGS. 8 and 9, it is noted that saw blade 50 is of the type which includes teeth 120 offset from the remainder 122 of the saw blade, as shown at offset tooth portions 124. As an offset tooth portion 124 engages a corresponding guide surface, illustrated at 66 in FIG. 8 and at 90 in FIG. 9, the saw blade 50 will be moved out of the respective cutting path 60 and 82, as illustrated

in phantom, so as to pass over the corresponding bar 56 or base member 22. In order to assure that the saw blade 50 is aligned accurately with the appropriate cutting path upon entering the bone of the femur 10 at the commencement of a cut, as illustrated in full lines, clearance means are provided so that the offset tooth portion 124 will clear the respective guide surface just prior to entering the distal femur, when the teeth 120 are juxtaposed with the transverse surface 16 on the femur, and the saw blade 50, and the teeth 120 thereof, will be located within the corresponding delineated cutting path. Thus, as seen in FIG. 8, the bar 56 is juxtaposed with the transverse surface 16 and the cylindrical configuration of bar 56 establishes a gap 126 along the cutting path 60 between the guide surfaces provided by the bars and the plane P which extends along the transverse surface 16 and represents the basal plane of basal surface 24, which gap 126 accommodates the offset tooth portion 124 to enable the saw blade 50, and the teeth 120 thereof, to be located precisely within the delineated cutting path 60 at the commencement of the corresponding posterior femoral cut 72 for accuracy in the completed cut. Likewise, a small radius is provided at 128 on the base member 22 to establish a gap 130 juxtaposed with the basal surface 24, along the cutting path 82 between the guide surface 90 and the plane P, for accommodating the offset tooth portion 124 and assuring accuracy at the commencement of the posterior chamfer cut 94. Corresponding gaps 126 and 130 are located similarly in connection with the guide surfaces 46 and 84, as seen in FIGS. 3 and 5.

It will be seen that the cutting guide 20 provides a single component which can be placed on the transverse surface 16 of the distal femur for accomplishing the guiding of a saw blade for the execution of all four of the cuts, in full, as required for the implant of the femoral component of a knee prothesis. The cuts are accomplished with relative ease and with great accuracy, and can be completed more quickly, with safety.

Claims

1. A cutting guide (20) for guiding a saw blade during the preparation of a femur for the implant of a femoral knee prosthesis, the cutting guide (20) enabling guiding of the saw blade for cutting an axially directed anterior femoral cut, an axially directed posterior femoral cut, an anterior chamfer and a posterior chamfer, while the cutting guide (20) remains located and secured to the femur in a single position on a transverse surface located along the distal femur, the cutting guide comprising:

   a base member (22);

   locating and securing means (26) on the base member (22) for locating and securing the base member (22) on the femur at the transverse surface;

   opposite side members (30) extending from the base member (22) in an axial direction distally relative to the transverse surface;

   a first set of guide members (34, 36) extending laterally between the side members (30) and located to delineate transversely opposite boundaries (38) of an axially directed anterior cutting path (40) intercepting the anterior femur (42), the first set of guide members (34, 36) including opposite guide surfaces (44, 46) spaced apart axially along the anterior cutting path (40) for guiding the saw blade along the anterior cutting path (40) during the anterior femoral cut;

   a second set of guide members (54, 56) spaced transversely from the first set of guide members (34, 36), the second set of guide members (54, 56) extending laterally between the side members (30) and located to delineate transversely opposite boundaries of an axially directed posterior cutting path (60) intercepting the posterior femur, the second set of guide members (54, 56) including opposite guide surfaces (64, 66) spaced apart axially along the posterior cutting path for guiding the saw blade along the posterior cutting path during the posterior femoral cut; and

   a further set of guide members (22, 74) located transversely between the first and second sets of guide members (34, 36, 64, 66), the further guide members extending laterally between the side members (30) and located for delineating transversely opposite boundaries (76) of an oblique anterior chamfer cutting path (78) and delineating transversely opposite boundaries (80) of an oblique posterior chamfer cutting path (82), the further guide members (22,74) including first opposite guide surfaces (84,86) spaced apart along the oblique anterior chamfer cutting path for guiding the saw blade along the oblique anterior chamfer cutting path during the anterior chamfer cut and second opposite guide surfaces (90,92) spaced apart along the oblique posterior chamfer cutting path for guiding the saw blade during the posterior chamfer cut;

   the side members (30) being spaced apart laterally a distance sufficient to provide each of the delineated anterior cutting path, posterior cutting path, anterior chamfer cutting path and posterior chamfer cutting path with a continuous, uninterrupted lateral extent corresponding to the full lateral extent of the respective anterior femoral cut, posterior femoral cut, anterior

chamfer and posterior chamfer, whereby the full anterior femoral cut, the full posterior femoral cut, the full anterior chamfer and the full posterior chamfer are accomplished while the cutting guide (20) is located and secured on the femur in the single position on the transverse surface of the distal femur.

2. A cutting guide as claimed in claim 1 wherein the first set of guide members comprises a pair of guide members (34,36), and the opposite guide surfaces (44,46) of the first set of guide members are located one on each of the pair of guide members.

3. A cutting guide as claimed in claim 1 wherein the second set of guide members comprises a pair of guide members (54,56), and the opposite guide surfaces (64,66) of the second set of guide members are located one on each of the pair of guide members.

4. A cutting guide as claimed in claim 1 wherein the further set of guide members comprises a pair of guide members (22,74), and the first and second opposite guide surfaces (84,86,90,92) are located on the pair of guide members.

5. A cutting guide as claimed in claim 1 wherein the guide members of at least one of the first set of guide members and the second set of guide members are cylindrical bars.

6. A cutting guide as claimed in claim 1 wherein the guide members of the first set of guide members and the second set of guide members are cylindrical bars.

7. A cutting guide as claimed in claim 1 wherein one (84) of the first opposite guide surfaces of the further set of guide members is essentially flat and generally parallel to the anterior chamfer cutting path.

8. A cutting guide as claimed in claim 1 wherein one (90) of the second opposite guide surfaces of the further set of guide members is essentially flat and generally parallel to the posterior chamfer cutting path.

9. A cutting guide as claimed in claim 1 wherein one (84) of the first opposite guide surfaces of the further set of guide members is essentially flat and generally parallel to the anterior chamfer cutting path and one (90) of the second opposite guide surfaces of the further set of guide members is essentially flat and generally parallel to the posterior chamfer cutting path.

10. A cutting guide as claimed in claim 9 wherein the further set of guide members comprises a pair of guide members, and the first and second opposite guide surfaces are located on the pair of guide members.

11. A cutting guide as claimed in claim 1 wherein at least some of the guide members are formed from discrete components and are joined with the side members (30) such that the cutting guide is an integral assembly of the side members (30) and the guide members.

12. A cutting guide (20) for guiding a saw blade (50) during the preparation of a femur for the implant of a femoral knee prosthesis, the cutting guide (20) enabling guiding of the saw blade (50) for the execution of a cut such as any one of an axially directed anterior femoral cut, an axially directed posterior femoral cut, an anterior chamfer cut and a posterior chamfer cut, while the cutting guide (20) is placed on a transverse surface (16) located along the femur, the saw blade (50) having teeth (120) offset relative to the remainder of the saw blade and establishing offset tooth portions (124), the cutting guide (20) including a base member (22) at least a portion of which lies in a basal plane coincident with the transverse surface, locating and securing means (26) on the base member (22), for locating and securing the base member on the femur, with the portion of the base member against the transverse surface, and at least one guide member (56) juxtaposed with the transverse surface (16), when the cutting guide is placed on the transverse surface, the guide member including a guide surface (66) for delineating a cutting path (60) intercepting the femur, along which cutting path the saw blade is guided during the execution of the cut, wherein clearance means (126) are provided between the guide surface and the basal plane for accommodating the offset tooth portions of the saw blade when the offset tooth portions are juxtaposed with the transverse surface, with the saw blade guided along the cutting path, so as to enable location of the saw blade and the teeth thereof within the cutting path at the commencement of the corresponding cut.

13. A cutting guide as claimed in claim 12 wherein the clearance means (126) includes a gap along the cutting path (60) between the guide surface (66) and the basal plane.

14. A cutting guide as claimed in claim 12 wherein the base member (22) includes a basal surface (24) at least a portion of which is placed against the transverse surface when the base member is located and secured on the femur, and the clearance means (130) is located on the base member and is juxtaposed with the basal surface of the base member.

15. A cutting guide as claimed in claim 14 wherein the portion of the basal surface is planar.

16. A cutting guide as claimed in claim 15 wherein the clearance means (130) includes a gap along the cutting path (82) between the guide surface (90) and the basal plane.

Patentansprüche

1. Schnittführung (20) zur Sägeblattführung beim Präparieren eines Oberschenkelknochens für die Implantation einer femoralen Knieprothese, wobei die Schnittführung (20) das Führen des Sägeblattes erlaubt für das Ausführen eines axialgerichteten anterioren femoralen Schnitts, eines axialgerichteten hinteren femoralen Schnitts, einer anterioren Abschrägung und einer hinteren Abschrägung, obgleich die Schnittführung (20) feststeht und am Oberschenkelknochen an einer einzigen Stelle in einer querliegenden Fläche auf dem distalen Oberschenkelknochen befestigt ist, umfassend ein Sockelteil (22);

ein Stell- und Befestigungsmittel (26) auf dem Sockelteil (22) zum Anordnen und Befestigen des Sockelteils (22) auf dem Oberschenkelknochen in der querliegenden Fläche;

gegenüberliegende Seitenteile (30), die distal zur querliegenden Fläche in Axialrichtung vom Sockelteil weggehen;

einen ersten Satz Führungselemente (34, 36), der seitlings zwischen den Seitenteilen (30) verläuft und angeordnet ist, die quer gegenüberliegenden Begrenzungen (38) eines axialgerichteten anterioren Schnittweges (40), der den anterioren Oberschenkelknochen (42) durchtrennt, vorzuzeichnen, wobei der erste Satz Führungselemente (34, 36) gegenüberliegende Führungsflächen (44, 46) besitzt, axial beabstandet auf dem anterioren Schnittweg (40), um während des anterioren femoralen Schnitts das Sägeblatt auf dem anterioren Schnittweg (40) zu führen;

einen zweiten Satz Führungselemente (54, 56), der zum ersten Satz Führungselemente (34, 36) quergerichtet beabstandet ist, wobei der zweite Satz Führungselemente (54, 56) seitlings zwischen den Seitenteilen (30) verläuft und angeordnet ist, die quer gegenüberliegenden Begrenzungen eines axialgerichteten hinteren Schnittweges (60), der den hinteren Oberschenkelknochen durchtrennt, vorzuzeichnen, wobei der zweite Satz Führungselemente (54, 56) gegenüberliegende Führungsflächen (64, 66) besitzt, axial beabstandet auf dem hinteren Schnittweg, um während des hinteren femoralen Schnitts das Sägeblatt auf dem hinteren Schnittweg zu führen; und

einen weiteren Satz Führungselemente (22, 74), quer angeordnet zwischen dem ersten und dem zweiten Satz Führungselemente (34, 36, 64, 66), wobei die weiteren Führungselemente seitlings zwischen den Seitenteilen (30) verlaufen und angeordnet sind, die quer gegenüberliegenden Begrenzungen (76) eines schrägen anterioren Abschrägungsschnittweges (78) sowie die quer gegenüberliegenden Begrenzungen (80) eines schrägen hinteren Abschrägungsschnittweges (82) vorzeichnen, wobei die weiteren Führungselemente (22, 74) erste gegenüberliegende Fübrungsflächen (84, 86) besitzen, zueinander beabstandet auf dem schrägen anterioren Abschrägungsschnittweg, um während des anterioren Abschrägungsschnitts das Sägeblatt auf dem schrägen anterioren Abschrägungschnittweg zu führen, sowie zweite gegenüberliegende Führungsflächen (90, 92) besitzt, zueinander beabstandet auf dem schrägen hinteren Abschrägungsschnittweg, um während des hinteren Abschrägungsschnitts das Sägeblatt zu führen;

wobei die Seitenteile (30) zueinander seitwärts in einem Abstand stehen, der ausreicht, jedem vorgezeichneten anterioren und hinteren Schnittweg, jedem vorgezeichneten anterioren und hinteren Abschrägungsschnittweg mit einem stetigen, durchgehenden Seitenmaß zu versehen, das dem ganzen Seitenmaß des jeweiligen anterioren und hinteren femoralen Schnitts, der jeweiligen anterioren und hinteren Abschrägung entspricht, so daß der ganze anteriore femorale Schnitt, der ganze hintere femorale Schnitt, die ganze anteriore Abschrägung und die ganze hintere Abschrägung erfolgen kann, obgleich die Schnittführung (20) auf dem Oberschenkelknochen an einer einzigen Stelle in der querliegenden Fläche des distalen Oberschenkelknochens angeordnet und befestigt ist.

2. Schnittführung nach Anspruch 1, wobei der erste Führungselementesatz ein Führungselementepaar (34, 36) umfaßt und die gegenüberliegenden Führungsflächen (44, 46) des ersten Führungselementesatzes einzeln auf den Führungselementen des Paars angeordnet sind.

3. Schnittführung nach Anspruch 1, wobei der zweite Führungselementesatz ein Führungselementepaar (54, 56) aufweist und die gegenüberliegenden Führungsflächen (64, 66) des zweiten Führungselementsatzes einzeln auf den Führungselementen des Paares angeordnet sind.

4. Schnittführung nach Anspruch 1, wobei der weitere Führungselementesatz ein Führungselementepaar (22, 74) aufweist und die ersten und zweiten gegenüberliegenden Führungsflächen (84, 86, 90, 92) auf dem Führungselementepaar angeordnet sind.

5. Schnittführung nach Anspruch 1, wobei die Führungselemente zumindest des ersten oder des zweiten Führungselementesatzes zylindrische Stangen sind.

6. Schnittführung nach Anspruch 1, wobei die Führungselemente des ersten und des zweiten Führungselementsatzes zylindrische Stangen sind.

7. Schnittführung nach Anspruch 1, wobei eine (84) der ersten gegenüberliegenden Führungsflächen des weiteren Führungselementesatzes im wesentlichen eben und zum anterioren Abschrägungsschnittweg im allgemeinen parallel ist.

8. Schnittführung nach Anspruch 1, wobei eine (90) der zweiten gegenüberliegenden Führungsflächen des weiteren Führungselementesatzes im wesentlichen eben und zum hinteren Abschrägungsschnittweg im allgemeinen parallel ist.

9. Schnittführung nach Anspruch 1, wobei eine (84) der ersten gegenüberliegenden Führungsflächen des weiteren Führungselementesatzes im wesentlichen eben und zum anterioren Abschrägungsschnittweg im allgemeinen parallel ist und eine (90) der zweiten gegenüberliegenden Führungsflächen des weiteren Führungselementesatzes im wesentlichen eben und zum hinteren Abschrägungsschnittweg im allgemeinen parallel ist.

10. Schnittführung nach Anspruch 9, wobei der weitere Führungselementesatz ein Führungselementepaar umfaßt und die ersten und zweiten gegenüberliegenden Führungsflächen auf dem Führungselementepaar angeordnet sind.

11. Schnittfuhrung nach Anspruch 1, wobei zumindest einige der Führungselemente aus einzelnen Komponenten hergestellt und so mit den Seitenteilen (30) verbunden sind, daß die Schnittführung eine einstückige Baugruppe aus den Seitenteilen (30) und den Führungselementen ist.

12. Schnittführung (20) zum Führen eines Sägeblattes (50) beim Präparieren eines Oberschenkelknochens für die Implantation einer femoralen Knieprothese, wobei die Schnittführung (20) das Führen des Sägeblattes (50) zur Ausführung eines Schnitts erlaubt, wie eines axialgerichteten anterioren femoralen Schnitts, eines axialgerichteten hinteren femoralen Schnitts, eines anterioren Abschrägungsschnitts und eines hinteren Abschrägungsschnitts, obgleich die Schnittführung (20) in der querliegenden Fläche (16), die sich auf dem Oberschenkelknochen befindet, angeordnet ist; das Sägeblatt (50) Zähne (120) hat, die zum Rest des Sägeblattes versetzt sind und versetzte Zahnabschnitte (124) bilden; wobei die Schnittführung (20) umfaßt: ein Sockelteil (22), bei dem zumindest ein Abschnitt in der Grundebene liegt, die mit der querliegenden Oberfläche zusammenfällt; auf dem Sockelteil (22) eine Stell- und Befestigungseinrichtung (26), um das Sockelteil - mit dem Sockelteilabschnitt gegen die querliegende Fläche - auf dem Oberschenkelknochen anzuordnen und zu befestigen; und mindestens ein Führungselement (56) in Juxtaposition mit der querliegenden Fläche (16), ist die Schnittführung in der querliegenden Fläche angeordnet; wobei das Führungselement eine Führungsfläche (66) besitzt, um den Schnittweg (60), der den Oberschenkelknochen durchtrennt und auf dem das Sägeblatt bei der Ausführung des Schnittes geführt wird, vorzuzeichnen; wobei Abstandsmittel (126) zwischen der Führungsfläche und der Grundebene vorgesehen sind, damit die versetzten Zahnabschnitte des Sägeblatts Platz finden, wenn die versetzten Zahnabschnitte in Juxtaposition mit der querliegenden Fläche liegen und das Sägeblatt auf dem Schnittweg geführt wird, so daß zu Beginn des jeweiligen Schnitts das Sägeblatt und dessen Zähne in den Schnittweg gestellt werden können.

13. Schnittführung nach Anspruch 12, wobei auf dem Schnittweg (60) zwischen der Führungsfläche (66) und der Grundebene das Abstandsmittel (126) einen Spalt besitzt.

14. Schnittführung nach Anspruch 12, wobei das Sockelteil (22) eine Grundfläche (24) besitzt, von der zumindest ein Abschnitt gegen die

querliegende Fläche anliegt, ist das Sockelteil am Oberschenkelknochen angeordnet und befestigt, und das Abstandsmittel (130) auf dem Sockelteil angeordnet ist und in Juxtaposition mit der Grundfläche des Sockelteils steht.

15. Schnittführung nach Anspruch 14, wobei der Abschnitt der Grundfläche eben ist.

16. Schnittführung nach Anspruch 15, wobei auf dem Schnittweg (82) zwischen der Führungsfläche (90) und der Grundebene das Abstandsmittel (130) einen Spalt besitzt.

Revendications

1. Un guide de coupe (20) pour guider une lame de scie lors de la préparation d'un fémur pour l'implantation d'une prothèse fémorale de genou, le guide de coupe (20) permettant le guidage de la lame de scie pour pratiquer une coupe fémorale antérieure dirigée axialement, une coupe fémorale postérieure dirigée axialement, un chanfrein antérieur et un chanfrein postérieur, le guide de coupe (20) restant posé et fixé sur le fémur en une position unique sur une surface transversale située à l'extrémité distale du fémur, le guide de coupe comprenant :

un élément de base (22) ;

des moyens (26) de positionnement et de fixation de l'élément de base (22) pour positionner et fixer l'élément de base (22) sur la surface transversale du fémur ;

des éléments latéraux (30) se faisant face et s'étendant à partir de l'élément de base (22) en s'éloignant dans le sens axial de la surface transversale ;

un premier jeu d'éléments de guidage (34, 36) s'étendant latéralement entre les éléments latéraux (30) et positionnés de façon à délimiter les frontières (38) transversalement opposées d'une trajectoire de coupe (40) antérieure, dirigée axialement et interceptant la partie antérieure (42) du fémur, ce premier jeu d'éléments de guidage (34, 36) comportant des surfaces de guidage (44, 46) en regard, espacées axialement le long de la trajectoire de coupe (40) antérieure pour guider la lame de scie le long de la trajectoire de coupe antérieure (40) lors de la coupe fémorale antérieure ;

un second jeu d'éléments de guidage (54, 56) espacés transversalement du premier jeu d'éléments de guidage (34, 36), ce second jeu d'éléments de guidage (34, 36) s'étendant latéralement entre les éléments latéraux (30) en étant positionné de façon à délimiter les frontières transversalement opposées d'une trajectoire de coupe (60) postérieure dirigée axialement et interceptant la partie postérieure du fémur, ce second jeu d'éléments de guidage (54, 56) comportant des surfaces de guidage (64, 66) en regard, espacées axialement le long de la trajectoire de coupe postérieure pour guider la lame de scie le long de la trajectoire de coupe postérieure lors de la coupe fémorale postérieure ;

et un autre jeu d'éléments de guidage (22, 74) situés transversalement entre le premier et le second des jeux d'éléments de guidage (34, 36, 54, 56), ces autres éléments de guidage s'étendant latéralement entre les éléments latéraux (30) en étant positionnés de façon à délimiter les frontières (76) transversalement opposées d'une trajectoire de coupe (78) oblique du chanfrein antérieur et à délimiter les frontières (80) transversalement opposées d'une trajectoire de coupe (82) oblique du chanfrein postérieur, ces autres éléments de guidage (22, 74) comportant des premières surfaces de guidage (84, 86) en regard, espacées le long de la trajectoire de coupe oblique du chanfrein antérieur pour guider la lame de scie le long de la trajectoire de coupe oblique du chanfrein antérieur lors de la coupe du chanfrein antérieur et des secondes surfaces de guidage (90, 92) en regard, espacées le long de la trajectoire de coupe oblique du chanfrein postérieur pour guider la lame de scie lors de la coupe du chanfrein postérieur ;

les éléments latéraux (30) étant espacés latéralement d'une distance suffisante pour dégager l'ensemble des trajectoires délimitées, à savoir, la trajectoire de coupe antérieure, la trajectoire de coupe postérieure, la trajectoire de coupe de chanfrein antérieur et la trajectoire de coupe de chanfrein postérieur, avec une étendue latérale continue et ininterrompue correspondant à la pleine largeur des coupes respectives, à savoir, la coupe fémorale antérieure, la coupe fémorale postérieure et les chanfreins antérieur et postérieur, de telle sorte que l'intégralité de la coupe fémorale antérieure, l'intégralité de la coupe fémorale postérieure, l'intégralité du chanfrein antérieur et l'intégralité du chanfrein postérieur puissent s'effectuer alors que le guide de coupe (20) est placé et fixé sur le fémur dans une position unique sur la surface transversale de l'extrémité distale du fémur.

2. Guide de coupe selon la revendication 1, dans lequel le premier jeu d'éléments de guidage comprend une paire d'éléments de guidage (34, 36) et les surfaces de guidages (44, 46) en regard du premier jeu d'éléments de guida-

ge sont situées chacune sur l'un des deux éléments de guidage.

3. Guide de coupe selon la revendication 1, dans lequel le second jeu d'éléments de guidage comprend une paire d'éléments de guidage (54, 56) et les surfaces de guidages (64, 66) en regard du second jeu d'éléments de guidage sont situées chacune sur l'un des deux éléments de guidage.

4. Guide de coupe selon la revendication 1, dans lequel l'autre jeu d'éléments de guidage comprend une paire d'éléments de guidage (22, 74) et les première et seconde surfaces de guidages (84, 86, 90, 92) en regard sont situées sur la paire d'éléments de guidage.

5. Guide de coupe selon la revendication 1, dans lequel les éléments de guidage du premier jeu d'éléments de guidage et/ou du second jeu d'éléments de guidage sont des barres cylindriques.

6. Guide de coupe selon la revendication 1, dans lequel les éléments de guidage du premier jeu d'éléments de guidage et du second jeu d'éléments de guidage sont des barres cylindriques.

7. Guide de coupe selon la revendication 1, dans lequel l'une (84) des premières surfaces de guidage en regard de l'autre jeu d'éléments de guidage est essentiellement plane et généralement parallèle à la trajectoire de coupe du chanfrein antérieur.

8. Guide de coupe selon la revendication 1, dans lequel l'une (90) des secondes surfaces de guidage en regard de l'autre jeu d'éléments de guidage est essentiellement plane et généralement parallèle à la trajectoire de coupe du chanfrein postérieur.

9. Guide de coupe selon la revendication 1, dans lequel l'une (84) des premières surfaces de guidage en regard de l'autre jeu d'éléments de guidage est essentiellement plane et généralement parallèle à la trajectoire de coupe du chanfrein antérieur et l'une (90) des secondes surfaces de guidage en regard de l'autre jeu d'éléments de guidage est essentiellement plane et généralement parallèle à la trajectoire de coupe du chanfrein postérieur.

10. Guide de coupe selon la revendication 9, dans lequel l'autre jeu d'éléments de guidage comprend une paire d'éléments de guidage et la première et la seconde des surfaces de guidage en regard sont situées sur la paire d'éléments de guidage.

11. Guide de coupe selon la revendication 1, dans lequel l'un au moins des éléments de guidage est constitué à partir de pièces élémentaires assemblées aux éléments latéraux (30) de telle sorte que le guide de coupe constitue un ensemble monobloc d'éléments latéraux (30) et d'éléments de guidage.

12. Guide de coupe (20) pour le guidage d'une lame de scie (50) lors de la préparation d'un fémur pour l'implantation d'une prothèse fémorale de genou, le guide de coupe (20) permettant le guidage de la lame de scie (50) pour pratiquer, au choix, une coupe fémorale antérieure dirigée axialement, une coupe fémorale postérieure dirigée axialement, une coupe de chanfrein antérieur et une coupe de chanfrein postérieur, le guide de coupe (20) restant placé sur une surface transversale (16) située sur le fémur, la lame de scie (50) ayant des dents (120) déportées par rapport au reste de la lame de scie et formant la partie à dent déportée (124), le guide de coupe (20) comprenant un élément de base (22) dont une partie au moins repose sur un plan de base coïncidant avec la surface transversale, des moyens (26) de positionnement et de fixation prévus sur l'élément de base (22) pour positionner et fixer l'élément de base sur le fémur, la partie de l'élément de base étant contre la surface transversale et au moins un élément de guidage (56) contigu à la surface transversale (16) lorsque le guide de coupe est placé sur la surface transversale, l'élément de guidage comportant une surface de guidage (66) pour délimiter une trajectoire de coupe (60) interceptant le fémur, la lame de scie étant guidée le long de la trajectoire de coupe, tandis que des moyens de dégagement (126) sont prévus entre la surface de guidage et le plan de base pour recevoir la partie à dent déportée de la lame de scie lorsque la partie à dent déportée est contiguë à la surface transversale, la lame de scie étant guidée le long de la trajectoire de coupe de façon à permettre à la lame de scie et à ses dents de se positionner dans la trajectoire de coupe, au début de la coupe correspondante.

13. Guide de coupe selon la revendication 12, dans lequel le moyen de dégagement (126) inclut un espace libre le long de la trajectoire de coupe (60) entre la surface de guidage (66) et le plan de base.

14. Guide de coupe selon la revendication 12, dans lequel l'élément de base (22) inclut une surface de base (24) dont une partie au moins est placée contre la surface transversale lorsque l'élément de base est placé et fixé sur le fémur, le moyen de dégagement (130) étant situé sur l'élément de base et contigu à la surface de base de l'élément de base.

15. Guide de coupe selon la revendication 14, dans lequel la partie de la surface de base est plane.

16. Guide de coupe selon la revendication 15, dans lequel le moyen de dégagement (130) inclut un espace libre le long de la trajectoire de coupe (82) entre la surface de guidage (66) et le plan de base (90).

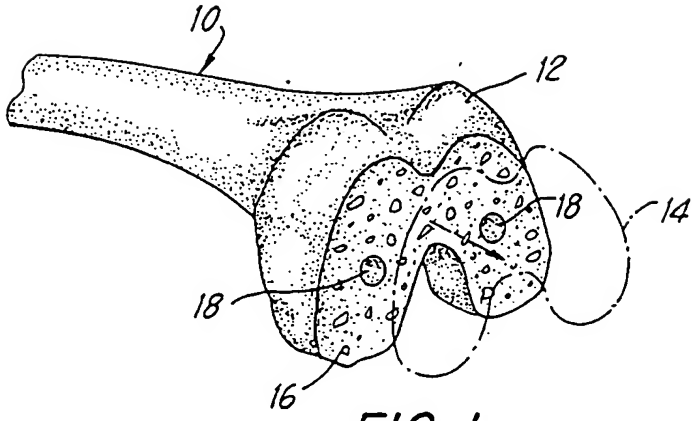

FIG. 1

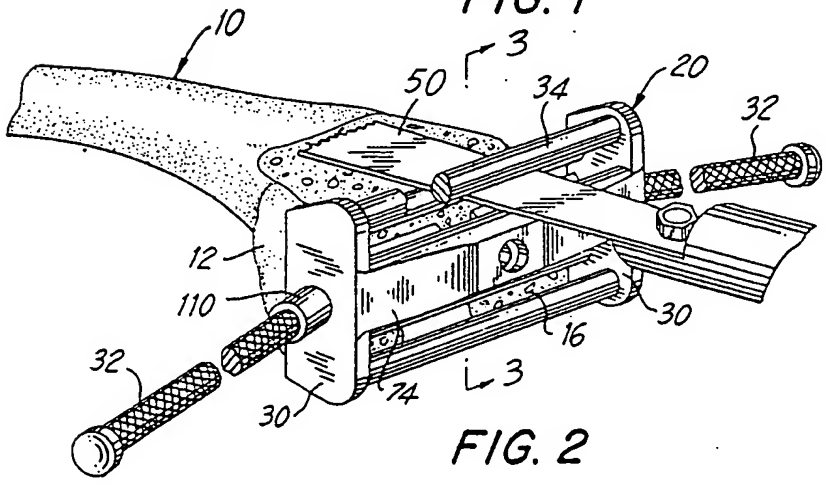

FIG. 2

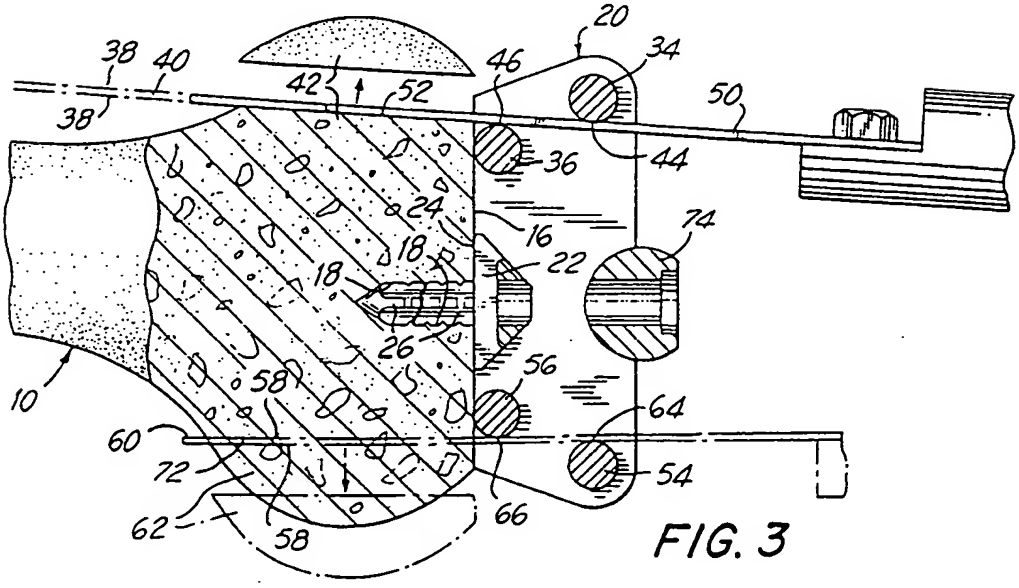

FIG. 3

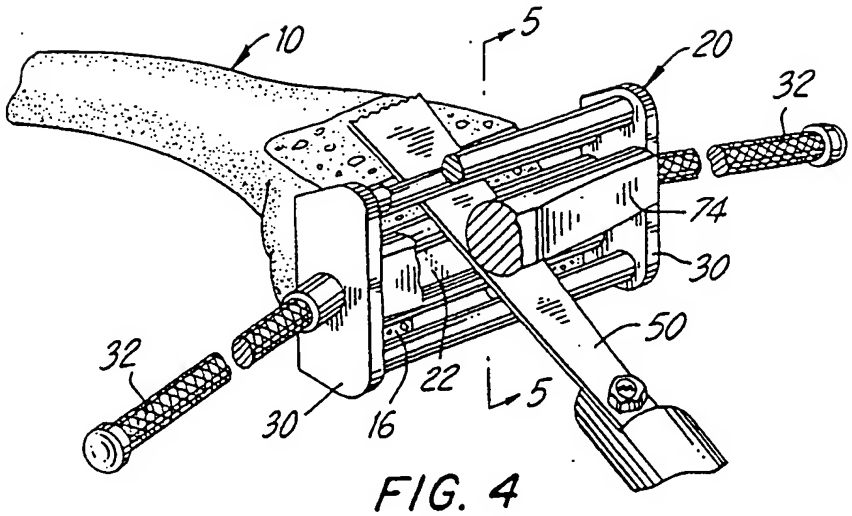

FIG. 4

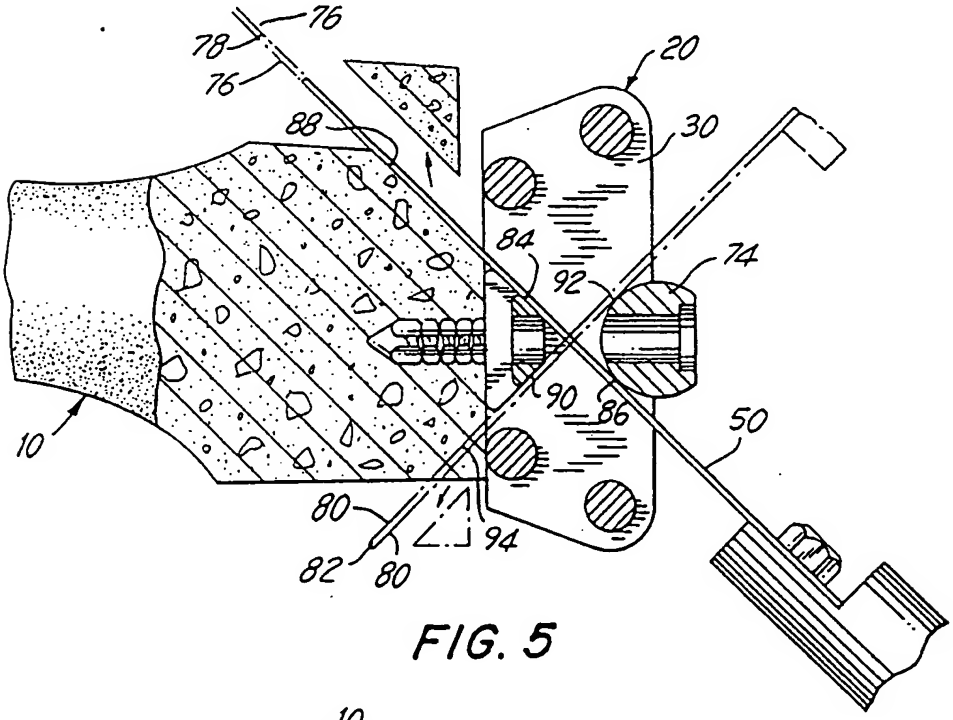

FIG. 5

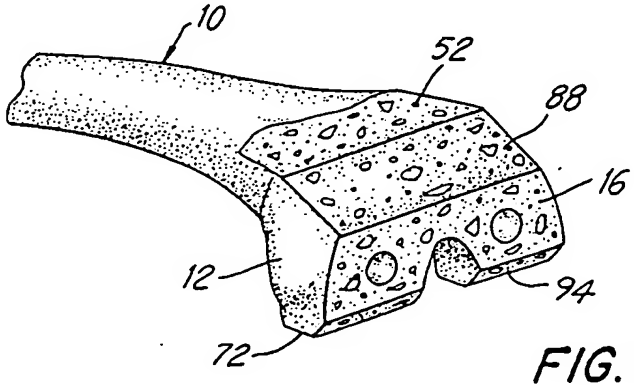

FIG. 6

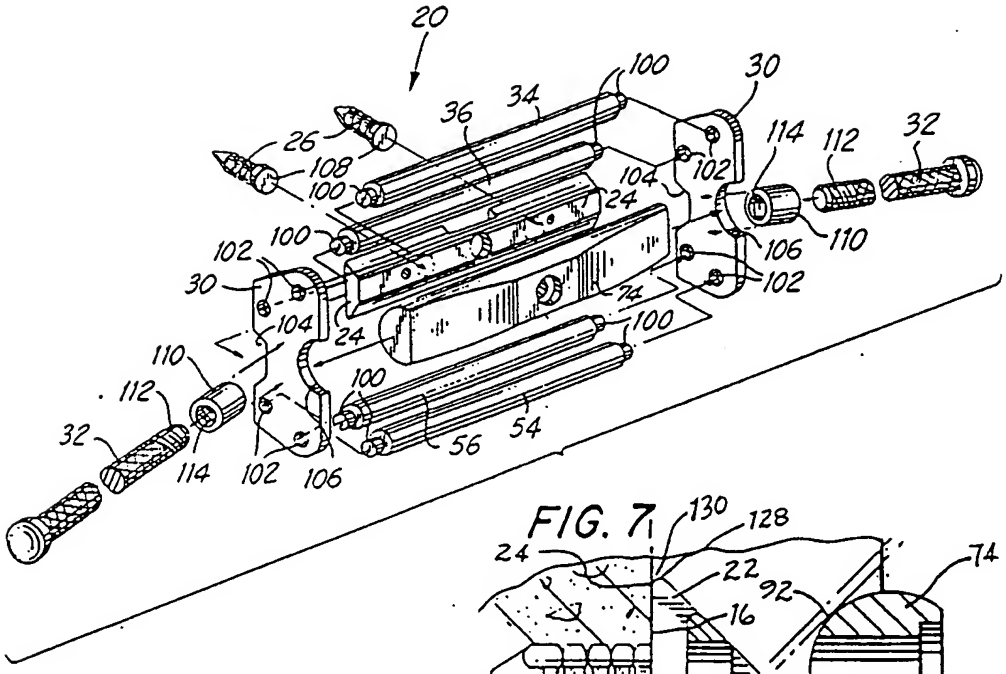

FIG. 7

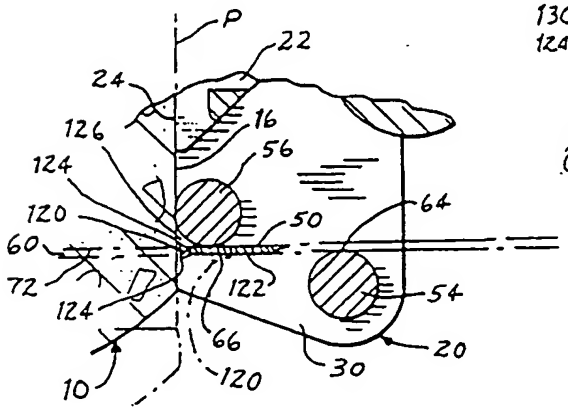

FIG. 8

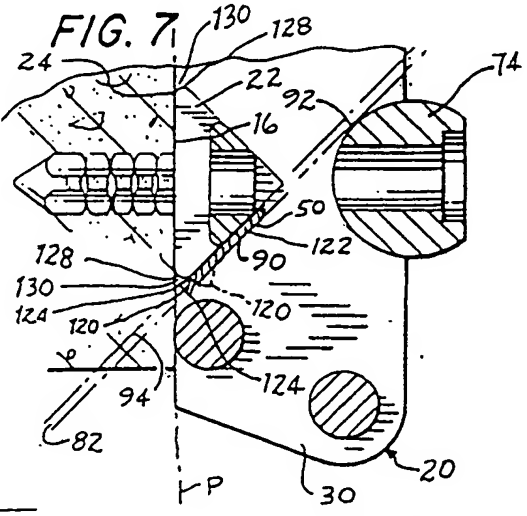

FIG. 9